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The Influence of Contextual Teaching and Learning Model on Students' Mathematical Problem Solving Ability

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***Abstract* – The purpose of this study is to determine the effect of *Contextual Teaching and Learning* model on students' mathematical communication skills. The research method used is quasi-experimental. The research subjects were 48 class 7 students of MTsN 1 Padang, Indonesia. The data was collected through communication skills test and then analyzed using t-test. The results showed that the students' mathematical communication skills in the experimental class was better than the control class. It can be concluded that the *Contextual Teaching and Learning* model could improve students' mathematical communication skills.**

Keywords—Contextual Teaching and Learning, Mathematical Communication Skills

I. INTRODUCTION

Mathematical communication skills are one of the important parts that must be developed in mathematics learning. In learning mathematics, students must have problem solving, reasoning and proof skills, communication, connections, and represent-ations [1]. In line with this, mathematics learning aims for students to have mathematical skills as part of life skills that must be had by students, especially in the development of reasoning, commu-nication, and problems solving which faced in everyday life [2].

The form of mathematical communication is an activity of mathematical understanding. Mathematical communication can be interpreted as an interrelationship / dialogue which occurs in a classroom environment, it could be written or verbally conveyed by the teacher to students for mutual communication [3]. It is important for students to have mathematical communication skills because it will help them in providing explanations and reasons for their answers [4].

Mathematical commu-nication is an important skill in mathematics, namely the ability to express mathematical ideas coherently to friends, teachers and others through spoken and written language. Through this mathematical communication ability students can develop mathematical understanding when using the correct mathematical language to write about mathematics, clarify ideas and learn to make arguments and also represent mathematical ideas orally, pictures and symbols [5].

That there are at least two important reasons why communication in learning mathematics needs to be developed in schools. First, mathematics are not merely a tool of thought, a tool for finding patterns, problems solving or making decisions but it is also as a tool to communicate various idea clearly, precisely and concisely. Second, mathe-matics could be the social activity in learning at the school, mathematics is also a vehicle for interaction between students and also as a means of communication between teachers and students [6].

The description above shown that high level skills in mathematics such as mathematical communication is far from what it was expected. Based on observations that researchers did at MTsN 1 Padang, the information was obtained that mathematics learning conducted in schools had not been able to fully develop students' high level mathematical skills. Mathematics learning generally still takes place in a traditional way with teacher-centered characteristics, using an expository approach so that teachers dominate the process of classroom learning activities while passive learners, in addition to exercises which are given questions in routine times. With the result that they lack training in reasoning the skill of students' think is in a low level.

The meaningful learning and process of activate the students are the solution to deal with problems that occur in the learning process. In mathematics learning students are fully involved actively in the process of learning. Learning activities allow students to socialize with respect for differences (opinions, attitudes and achievement abilities) and practice to collaborate in communicating ideas, results of creation and findings to the teacher and other students. Social interaction with peers, especially arguing in discussions, helps clarify the thinking that makes thinking logically. The communication and mathematical problem solving skills of students could be seen as the better result [7].

The learning which using *Contextual Teaching and Learning* model could improve the students' mathematical solving and communication skills [8]. Mathematical communication skills of students by using *Contextual*

Teaching and Learning cooperative learning look better than the classroom using conventional learning [9].

Students who are less in the habit of questioning what is unknown in a problem tend to achieve results and move to the next problem [10]. If someone has good problem solving skills, then students have good analytial skills to be applied in various situations so that they can solve mathematical problem [11]. The higher the mathematical problem solving ability, the higher the mathematical communication skills of the students [12].

Conditions in schools, mathematics teachers pay little attention to increase the students' activity in learning. Most students seemed to follow well every explanation or information from the teacher. The students are very rarely asking questions to the teacher so that the teacher engages theirselves in explaining what they have prepared, and the participants only accept what is conveyed by the teacher. As long as learning tends to be one-way, learning activities are more teachers than interaction between students. It means that the learning tends to be teacher-centered [13].

From the problems above, it can be concluded that the way of learning mathematics must be renewed in order to improve and increase the students' mathematical communication, in improve-ment an active and innovative learning model is needed. One learning model which can be used is *Contextual Teaching and Learning*.

Contextual Teaching and Learning model is a which designed to influence students' interaction patterns. First introduced by Frank Lyman et al. In 1985 from the University of Maryland, *Contextual Teaching and Learning* is an effective way to vary the atmosphere of students' discussion patterns, assuming that all discussions require arrangements to control the class as a whole, and the procedures used in *Contextual Teaching and Learning* are more time to think to respond and help each other [14].

Based on the description above, researchers are interested in conducting research with the title "Improving Mathematical Communication Ability of Junior High School Students through *Contextual Teaching and Learning* ".

II. METHOD

The type of the research is quasi experimental. The design of the research is only random group design. The research design can be seen in table 1.

TABLE 1. RESEARCH DESIGN

Class	Treatment	Test
Eksperiment	X	T
Control	-	T

Source: Arikunto (2010:87)

Information:

X = *Contextual Teaching and Learning*

T = Final test, test mathematical communication skills

The instrument in this study only uses a test instrument, which is a description test to measure students' mathematical commu-nication skills. For data analysis, researcher used the help of SPSS 21 and Microsoft Excel 2010 software programs.

This test was validated by three mathema-ticians, then tested on a group of seventh grade students to meet the validity and reliability criteria. Students' skill scores in the communication skills of students are determined by using rubric scoring made. Furthermore, the data were analyzed using two-way t-test and anova after conducting a series of normality and homogeneity tests.

III. RESULT AND DISCUSSION

Before analyzing the data, a trial analysis was carried out to find out the validity of the questions, distinguishing power, level of difficulty and reliability. Tests performed using Microsoft Excel 2010 results obtained can be seen in the following table.

TABLE 2. CALCULATION RESULTS OF VALIDITY TESTS FINAL TEST QUESTIONS

Number Question	r_{xy}	r Table	Criteria
1a	0,860	0,444	Valid
1b	0,854	0,444	Valid
1c	0,872	0,444	Valid
1d	0,876	0,444	Valid
2a	0,874	0,444	Valid
2b	0,868	0,444	Valid
2c	0,865	0,444	Valid
2d	0,874	0,444	Valid
3	0,874	0,444	Valid
4	0,869	0,444	Valid
5	0,867	0,444	Valid

TABLE 3. CALCULATION RESULTS DIFFERENCE PROBLEM

Number Question	DP	Criteria
1a	0,570	Soal diterima
1b	0,500	Soal diterima
1c	0,590	Soal diterima
1d	0,560	Soal diterima
2a	0,400	Soal diterima
2b	0,600	Soal diterima
2c	0,650	Soal diterima
2d	0,670	Soal diterima
3	0,540	Soal diterima
4	0,500	Soal diterima
5	0,700	Soal diterima

From table 1 and 2, the results of the validity of all the questions are considered valid, for the distinguishing power of all questions received and categorized as all easy questions. For reliability calculations get r_{11} = 0.860 so that the problem has a high correlation.

Based on data analysis, the communication skills of students applied during learning can be seen in Table 4.

TABLE 4. AVERAGE PROBLEM SOLVING ABILITY AND COMMUNICATION OF STUDENTS TABEL 4.

Kelas	N	Rata-Rata	
		Pemecahan Masalah	***Kemampuan Komunikasi***
Eksperimen	24	4,5	9,4
Kontrol	24	4,0	8,3

Table 4 shows that the average value of students who learn using *Contextual Teaching and Learning* is higher than those who learn using scientific learning.

To find out the test used in hypothesis testing, a normality and homogeneity test is first carried out. The test carried out is assisted by SPSS software, the test results can be seen in table 5.

TABLE 5. NORMALITY TEST RESULT

Sample Class	Sig.
Eksperiment	0,108
Control	0,227

Table 5 shows that the two sample classes have a Sig value. > 0.05 so it can be concluded that the sample class value is normally distributed

Then, a homogeneity test was carried out on the two sample classes that studied with a different approach with the help of SPSS software, which obtained the sig value. 0.21. So the hypothesis used in the sample class uses the t-test. The results of hypothesis testing conducted by the SPSS software, it can be seen in table 6.

TABLE 6. STUDENTS' COMMUNICATION ABILITY VALUE HYPOTHESIS TEST RESULTS.

Skills	Sig.
Mathematical communication	0,000

The results of hypothesis testing in Table 6 shows that the value of sig. <0.05. It could be expressed as H_0 denial, namely the mathematical communication skill of students who learn by using Think Pair Share learning model better than scientific learning.

IV. CONCLUSION

Based on the results of the research which conducted in classes 7.1 and 7.2 SMPN 4 Painan, it could be concluded that the mathematical communication skills of students who learn by applying Think Pair Share learning model is better than scientific learning.

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